

Patent Claims

1. Liquid crystal display with a plurality of pixels, having a liquid crystal cell and polarizers (4,5), which are arranged on the top and bottom of the liquid crystal cell, the liquid crystal cell having two substrates (1, 2) with transparent electrodes and a liquid crystal (3) sandwiched therebetween, characterized in that each pixel is subdivided into at least two subpixels (6, 7), in which the liquid crystal has different orientations, and an optically biaxial retardation film (V1, V2) with different refraction indices n_e , n_0 , n_z is provided between a polarizer (4, 5) and the liquid crystal (3) to compensate for the dependence of the optical characteristics of the liquid crystal display such as transmission and contrast on the viewing angle, the refraction index n_z occurring along an axis that is essentially parallel to the normal to the liquid crystal cell in the retardation film.
2. Liquid crystal display according to Claim 1, characterized in that for the refraction indices n_e , n_0 , n_z of the biaxial retardation film, $n_e - n_0 > 0$ and $n_z - n_0 < 0$.
3. Liquid crystal display according to one of the foregoing claims, characterized in that the retardation film is arranged on the liquid crystal cell between the polarizer (4, 5) and the liquid crystal cell.
4. Liquid crystal cell according to one of the foregoing claims, characterized in that the retardation film is arranged in the liquid crystal cell between the liquid crystal (3) and the substrate (1, 2).
5. Liquid crystal cell according to one of the foregoing claims, characterized in that the retardation film is arranged on both sides between the liquid crystal (3) and the polarizers (4, 5).
6. Liquid crystal display according to one of the foregoing claims, characterized in that, in a retardation film arranged on both sides, the retardation film has the following characteristics : $70 \text{ nm} < (n_e - n_0) \cdot d < 200 \text{ nm}$ and $-200 \text{ nm} < (n_z - n_0) \cdot d < 0$, where d is the

thickness of the retardation film.

7. Liquid crystal display according to Claim 6, characterized in that, for a retardation film applied on one side, the values given in nanometers remain essentially unchanged.
8. Liquid crystal display according to one of the foregoing claims, characterized in that one or more plastic films may be used as the retardation film.
9. Liquid crystal display according to Claim 8, characterized in that a unidirectional plastic film, which is not stretched to saturation, is provided as the retardation film.
10. Liquid crystal display according to Claim 8, characterized in that the retardation film is a plastic film that is stretched bidirectionally.
11. Liquid crystal display according to one of Claims 8 through 10, characterized in that the retardation film is formed by a combination of one or more uniaxially positive and one or more uniaxially negative films.
12. Liquid crystal display according to one of the foregoing claims, characterized in that the retardation film is implemented in the form of a holographic element.
13. Liquid crystal display according to one of the foregoing claims, characterized in that the retardation film is implemented in the form of a liquid crystal polymer.
14. Liquid crystal display according to one of the foregoing claims, characterized in that the liquid crystal is oriented in different manners in the subpixels of a pixel so that the viewing angle ranges of the individual pixels supplement one another to form an essentially point-symmetric viewing angle range.
15. Liquid crystal display according to one of the foregoing claims, characterized in that the liquid crystal cell is a TN cell twisted by 80° to 100° .

16. Liquid crystal display according to one of the foregoing claims, characterized in that a photosensitive layer, in which the preferential direction of the liquid crystal molecules arranged thereon can be determined by exposure to light, can be used to orient the liquid crystal molecules on the substrate surface.

17. Liquid crystal display according to one of the foregoing claims, characterized in that the boundary areas between the subpixels are covered by a mask.

18. Liquid crystal display according to one of the foregoing claims, characterized in that each pixel has a switching element.

19. Liquid crystal display according to one of the foregoing claims, characterized in that each pixel has a thin-layer transistor and a reservoir capacitor, with at least one electrode of the reservoir capacitor being implemented using a conductive, non-transparent layer, which covers the boundary area between the subpixels.

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